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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/772,546	01/30/2001	Walter D. Aldred	19.0299	9245

7590 04/18/2005

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EXAMINER
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SHAAWAT, MUSSA

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 04/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/772,546

Applicant(s)

ALDRED ET AL.

Examiner

Mussa A. Shaawat

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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### DETAILED ACTION

1. Claims 1-33 are pending.

#### *Drawings*

2. New formal drawings are required in this application. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

#### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) The invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Rao Patent No. (6,480,118) referred to hereinafter as Rao.

As per claim 1, Rao teaches a method for characterizing a drilling hazard in a proposed wellbore, comprising: determining a well plan including at least a wellbore trajectory, see (col.1, lines 10-15, 55-57, and col.4, lines 35-45); estimating a likelihood of occurrence of, a position along the trajectory and a severity of consequences of at least one drilling hazard, see (col.4, lines 45-65, and col.7, lines 40-45, and col.8, lines

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10-35); and displaying on a representation of at least a portion of the wellbore trajectory, at least one of the position of, the likelihood and the severity of the at least one drilling hazard, see (col.9, lines 30-40, and col.10, lines 60-67, and col.4, lines 45-65, and col.8, lines 10-20, lines 45-67).

As per claim 2, Rao teaches a method as defined in claim 1 wherein estimating the position, likelihood and severity is performed by determining a Bayesian uncertainty thereof based on a correlation of the well plan to a model of earth formations along the wellbore trajectory; see (col.11, lines 20-67, Rao teaches using any of a variety algorithms, techniques and/or methods for predicting drilling hazards one of which could be Bayesian method).

As per claim 3, Rao teaches a method as defined in claim 2 wherein the earth model is generated from at least one of offset wellbore data, seismic survey data and correlative wellbore data from similar earth formations distal from a location of the proposed wellbore, see (col.3, lines 1-20).

As per claim 4, Rao teaches a method as defined in claim 1 further comprising: adjusting at least one well plan parameter, see (col.5, lines 25-30); recalculating at least one of the position, the likelihood and the severity of the at least one drilling hazard; and repeating the displaying, see (col.6, lines 15-30).

As per claim 5, Rao teaches a method as defined in claim 4 further comprising: repeating the adjusting and recalculating until at least one of a most likely cost to drill a wellbore, an estimated amount of lost time and a likelihood of encountering the at least one drilling hazard is minimized, see (col.6, lines 15-67).

As per claim 6, Rao teaches a method as defined in claim 4 wherein the at least one well plan parameter comprises one of casing depth, dog leg severity, and mud weight, see (col.6, lines 5-15, and col.7, lines 25-30).

As per claim 7, Rao teaches a method as defined in claim 4 wherein the at least one well plan parameter includes at least one drilling operating parameter; see (col.8, lines 1-15).

As per claim 8, Rao teaches a method as defined in claim 7 wherein the at least one drilling operating parameter comprises at least one of weight on bit and rotary speed; see (col.11, lines 14-21, and col.3, lines 55-60, and col.5, lines 55-67, and col.6, lines 5-15).

As per claim 9, Rao teaches a method as defined in claim 1 wherein the at least one drilling hazard comprises at least one of stuck pipe, lost circulation, taking a kick and BHA component failure, see (col.4, 55-67).

As per claim 10, Rao teaches a method as defined in claim 1 wherein the displaying comprises presenting a graphic cylinder on the representation at the position, a diameter of the cylinder related to the likelihood, a length of the cylinder related to the severity and a color of the cylinder related to a type of the at least one drilling hazard; see (col.9, lines 30-40, and col.10, lines 60-67 and col.11, lines 1-5).

As per claim 11 Rao teaches a method as defined in claim 1 wherein the displaying comprises presenting with respect to depth in the wellbore at least one of a color coded and shade coded indicator, the indicator corresponding to one of the

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likelihood of and the severity of the drilling hazard, see (col.9, lines 30-40, and col.10, lines 60-67 and col.11, lines 1-5).

As per claim 12, Rao teaches a method as defined in claim 11 further comprising a reference indicator disposed proximate to the at least one of the color coded and shade coded indicators, the reference indicator tied to a textual description of at least the type of drilling hazard, see (col.9, lines 30-40, and col.10, lines 60-67 and col.11, lines 1-5).

As per claim 13, Rao teaches a method for optimizing a well plan for a proposed wellbore, comprising: selecting an initial well plan comprising at least a wellbore trajectory, see (col.1, lines 10-15, 55-57, and col.4, lines 35-45); determining for the initial well plan a position along the trajectory, a likelihood of occurrence, and a severity of consequence of encountering at least one drilling hazard, see (col.4, lines 45-65, and col.7, lines 40-45, and col.8, lines 10-35); adjusting at least one parameter of the initial well plan, see (col.5, lines 25-30); redetermining the position, likelihood and severity of the at least one drilling hazard, see (col.6, lines 15-30); and repeating the adjusting and redetermining until at least one of a most likely cost to drill a wellbore, an amount of lost time and a likelihood of encountering the at least one drilling hazard is minimized, see (col.6, lines 15-67).

As per claim 14, Rao teaches a method as defined in claim 13 wherein determining and the redetermining the position, likelihood and severity are performed by determining a Bayesian uncertainty thereof based on a correlation of the well plan on a model of earth formations along the wellbore trajectory, see (col.11, lines 20-67,

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Rao teaches using any of a variety algorithms, techniques and/or methods for predicting drilling hazards one of which could be Bayesian method).

As per claim 15, Rao teaches a method as defined in claim 14 wherein the earth model is generated from at least one of offset wellbore data, seismic survey data and correlative wellbore data from similar earth formations distal from a location of the proposed wellbore, see (col.3, lines 1-20).

As per claim 16, Rao teaches a method as defined in claim 13 wherein at least one well plan parameter comprises one of casing depth, dog leg severity, and mud weight, see (col.6, lines 5-15, and col.7, lines 25-30).

As per claim 17, Rao teaches a method as defined in claim 15 wherein at least one well plan parameter includes at least one drilling operating parameter, see (col.8, lines 1-15).

As per claim 18, Rao teaches a method as defined in claim 15 wherein the at least one drilling operating parameter comprises at least one of weight on bit and rotary speed, see (col.11, lines 14-21, and col.3, lines 55-60, and col.5, lines 55-67, and col.6, lines 5-15).

As per claim 19, Rao teaches a method as defined in claim 1 wherein at least one drilling hazard comprises at least one of stuck pipe, lost circulation, taking a kick and BHA failure, see (col.4, 55-67).

As per claim 20, Rao teaches a method as defined in claim 13 further comprising displaying in graphic form at least one of the position, likelihood and severity of the at

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least one drilling hazard for evaluation by a system operator, see (col.9, lines 30-40, and col.10, lines 60-67, and col.4, lines 45-65, and col.8, lines 10-20, lines 45-67).

As per claim 21, Rao teaches a method as defined in claim 20 wherein the displaying comprises presenting a graphic cylinder on the representation at the position, a diameter of the cylinder related to the likelihood, a length of the cylinder related to the severity and a color of the cylinder related to a type of the at least one drilling hazard, see (col.9, lines 30-40, and col.10, lines 60-67 and col.11, lines 1-5).

As per claim 22, Rao teaches a method as defined in claim 20 wherein the displaying comprises presenting with respect to depth in the wellbore at least one of a color coded and shade coded indicator, see (col.9, lines 30-40, and col.10, lines 60-67 and col.11, lines 1-5).

As per claim 23, Rao teaches a method for drilling a well, comprising selecting an initial well plan comprising at least a wellbore trajectory; starting drilling the well according to the initial well plan, see (col.1, lines 10-15, 55-57, and col.4, lines 35-45); measuring at least one of a drilling operating parameter and an earth formation characteristic during the drilling, see (col.1, lines 45-60, and col.3, lines 50-65, and col.7, lines 25-35); determining at least one of a position along the trajectory, a likelihood of encountering and a severity of occurrence of at least one drilling hazard in response to the measuring, see (col.4, lines 45-65, and col.7, lines 40-45, and col.8, lines 10-35); adjusting at least one parameter of the initial well plan for an unfinished portion of the well, see (col.5, lines 25-30); redetermining the position, likelihood and severity of the at least one drilling hazard, see (col.6, lines 15-30); repeating the



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adjusting and redetermining until for the unfinished portion of the well at least one of a most likely cost to drill, an amount of lost time and a likelihood of encountering the at least one drilling hazard is minimized; and drilling the unfinished portion of the well according to the adjusted well plan, see (col.6, lines 15-67).

As per claim 24, Rao teaches a method as defined in claim 23 wherein the determining and redetermining the position, likelihood and severity are performed by determining a Bayesian uncertainty thereof based on a correlation of the initial well plan to a model of earth formations along the wellbore trajectory, see (col.11, lines 20-67, Rao teaches using any of a variety algorithms, techniques and/or methods for predicting drilling hazards one of which could be Bayesian method).

As per claim 25, Rao teaches a method as defined in claim 24 wherein the earth model is generated from at least one of offset wellbore data, seismic survey data and correlative wellbore data from similar earth formations distal from a location of the proposed wellbore, see (col.3, lines 1-20).

As per claim 26, Rao teaches a method as defined in claim 25 wherein the earth model is redetermined using data from the measuring, and the Bayesian uncertainty is determined by correlating the adjusted initial well plan to the redetermined earth model, see (col.3, lines 1-20).

As per claim 27, Rao teaches a method as defined in claim 23 wherein the at least one well plan parameter comprises one of casing depth, dog leg severity, and mud weight, see (col.6, lines 5-15, and col.7, lines 25-30).

As per claim 28, Rao teaches a method as defined in claim 23 wherein the at least one well plan parameter includes at least one drilling operating parameter; see (col.8, lines 1-15).

As per claim 29, Rao teaches a method as defined in claim 28 wherein the at least one drilling operating parameter comprises at least one of weight on bit and rotary speed, see (col.11, lines 14-21, and col.3, lines 55-60, and col.5, lines 55-67, and col.6, lines 5-15).

As per claim 30, Rao teaches a method as defined in claim 23 wherein the at least one drilling hazard comprises at least one of stuck pipe, lost circulation, taking a kick and BHA failure, see (col.4, 55-67).

As per claim 31, Rao teaches a method as defined in claim 23 further comprising displaying in graphic form the position, likelihood and severity of the at least one drilling hazard for evaluation by a system operator, see (col.9, lines 30-40, and col.10, lines 60-67, and col.4, lines 45-65, and col.8, lines 10-20, lines 45-67).

As per claim 32, Rao teaches a method as defined in claim 31 wherein the displaying comprises presenting a graphic cylinder on the representation at the position, a diameter of the cylinder related to the likelihood, a length of the cylinder related to the severity and a color of the cylinder related to a type of the at least one drilling hazard, see (col.9, lines 30-40, and col.10, lines 60-67 and col.11, lines 1-5).

As per claim 33, Rao teaches a method as defined in claim 31 wherein the displaying comprises presenting with respect to depth in the wellbore at least one of a

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color coded and shade coded indicator, see (col.9, lines 30-40, and col.10, lines 60-67 and col.11, lines 1-5).

### ***Response to Arguments***

5. Applicant's arguments have been fully considered but they are not persuasive.

In the remarks, the applicant argues in substance that; A) Rao does not teach or suggest an undesirable occurrences during drilling, an example would include lost circulation, stuck pipe and taking a kick; B) Rao does not teach or suggest Applicant's claimed "likelihood of an occurrence ... of at least one drilling hazard"; C) Rao does not teach or suggest any "correlation of the well plan to a model of the earth"; D) Rao does not teach or suggest "adjusting one well parameter" and "calculating the drilling hazard information" to minimize the likelihood of encountering a drilling hazard.

In response to A) applicant is arguing "Rao does not teach or suggest an undesirable occurrences during drilling, an example would include lost circulation, stuck pipe and taking a kick". These limitation(s) are not found in the claims. Claimed subject matter not the specification is the measure of the invention. Disclosure contained in the specification cannot be read into the claims for the purpose of avoiding prior art. In re Sporck, 55 CCPA 743, 386 F .2d 924, 155 USPQ 687 (1986); In re Self, 213 USPQ 1, 5 (CCPA 1982); In re Priest, 199 USPQ 11, 15 (CCPA 1987).

In response to B) Rao discloses a method for reducing hazards in drilling subterranean wells by using an acoustical system to look ahead of the drilling bit, detects and analyzes geological features ahead of the bit which may be qualified as drilling hazards (see Abstract). In addition Rao discloses equipment for acoustically

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looking ahead of the drill bit, while the well is being drilled, e.g., one hundred meters or more, analyzing and interpreting the data to identify and predict formation characteristics and properties of geologic features and structures within the planned drill path which results in reduced risk of incurring unanticipated drilling hazards i.e. determining the likelihood occurrences of a drilling hazards (see col.1 lines 5-22). Therefore Rao meets the scope of the claimed limitation "likelihood of an occurrence ... of at least one drilling hazard".

In response to C) Rao discloses traditionally the vast majority of the information used in planning and drilling a well is obtained and analyzed prior to drilling (see col.1 lines 58-67, and figure 1 shows drilling on earth surface according to a well plan). Therefore Rao meets the scope of the claimed limitation "correlation of the well plan to a model of the earth".

In response to D) Rao discloses calculating techniques to find the range and direction from the bit to a potential hazard so to identify the relative position of the hazard in relation to the bit and planned drilled path, once the range and the location of the hazard are determined, a drilling parameter may be adjusted accordingly (see col.8 lines 47-67). Therefore, Rao meets the scope of the claimed limitation "adjusting one well parameter" and "calculating the drilling hazard information" to minimize the likelihood of encountering a drilling hazard.

In light of the foregoing arguments, the 35 USC 102 rejection is hereby sustained.

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Robbins et al. Patent No. (5,678,643) Acoustic logging while drilling tool to determine bed boundaries.
- Rey-Fabret et al. Patent No. (5,999,891) method and system for detecting the precision of an element of a drill string.
- Goldman Patent No. (5,390,748) method and apparatus for drilling optimum subterranean well boreholes.
- Jervis et al. Patent No. (5,952,569) alarm system for wellbore site.
- Booth et al. patent No. (5,555,531) method for identification of near-surface drilling hazards.

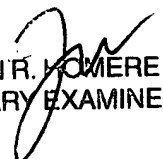
- Omeragic et al. Patent No. (6,594,584) method for calculating a distance between a well logging instrument and a formation boundary by inversion processing measurements from the logging instruments.
- Stoner Patent No. (6,101,444) Numerical control unit for wellbore drilling.

***Communication***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mussa A Shaawat whose telephone number is (571) 272-3785. The examiner can normally be reached on Monday-Friday (8:30am to 5:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean R Homere can be reached on (571) 272-3780. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mussa Shaawat  
Patent Examiner  
April 14, 2005

  
JEAN R. HOMERE  
PRIMARY EXAMINER